a low concentration drain region of the second conductive type disposed in the semiconductor substrate and provided to face said source region through a channel region;

a high concentration drain region of the second conductive type spaced away from another end of said gate electrode and disposed in said low concentration drain region; and

a middle concentration layer of the second conductive type disposed in said low concentration drain region and disposed at least from a predetermined position spaced away from said gate electrode to said high concentration drain region,

wherein an impurity concentration of said middle concentration layer increases from near the gate electrode to near said high concentration drain region. (Emphasis added)

Applicants respectfully assert that the bolded features of claim 1 are not taught or suggested by the prior art references for the following reasons.

To establish a prima facie case of obviousness, three basic criteria must be met including that the prior art reference (or references when combined) must teach or suggest all the claim limitations. (See MPEP 2143.01 Suggestion or Motivation to Modify the References)

The Office action asserts that layer 22 of the Hsing reference is equivalent to "a low concentration drain region of the second conductive type disposed in the semiconductor substrate" as recited in claim 1 of the present invention. Applicants respectfully disagree.

Hsing makes clear that layer 22 is **not** a drain region, rather it is an epitaxial layer. (See column 2, lines 56 to 63) As it is known to one skilled in the art, an epitaxial layer has a different structure as well as performs a different function than a drain region.

Moreover, the layer 22 of Hsing is disposed in a N+ buried layer 23 and **not** disposed in the substrate 20. That is, layer 22 of Hsing is **not** "disposed in the semiconductor substrate" as recited in claim 1 of the present invention. As Hsing explained below, the N+ buried layer 23 is desirable because it may help reduce the beta of any parasitic transistor formed. (See column 3, lines 1-4) As a result, one skilled in the art would not be motivated to remove this buried layer because of its desirable characteristics.

Furthermore, the Hsing reference fails to teach or suggest "a low concentration drain region of the second conductive type disposed in the semiconductor substrate **and** provided to face said source region through a channel region" as recited in claim 1. As explained above, layer 22 is not a drain region, rather it is an epitaxial layer. FIG. 2 of Hsing shows a body layer

29 formed between source region 32 and eptixial layer 22 which prevent a drain region (e.g., layer 31) from facing the source region through a channel. In other words, Hsing shows a body layer 29 formed **between** a source region 24 and an epitaxial layer 22, which is **not** a drain layer, whereas claim 1 of the present invention recites a drain region disposed in a substrate and "provided to face said source region through a channel region" as recited in claim 1.

Moreover, the office action asserts that layer 31 is equivalent to "a middle concentration layer of the second conductive type **disposed** in said low concentration **drain region"** and "disposed at least from a predetermined position spaced away from said gate electrode to said high concentration drain region" as recited in claim 1. Applicants respectfully disagree. Layer 31 of the Hsing reference is a drift region disposed in an N- epitaxial layer, which is not a drain region as recited in claim 1. As it is known to one skilled in the art, an epitaxial layer has a different structure as well as performs a different function than a drain region.

The use of a middle concentration layer as recited in claim 1 of the present invention may have various advantages which the prior art references may lack. For example, the background of the present application explains that a conventional device (See FIGS. 6 and 11) may suffer from problems due to depletion layer spreading to channel region. (See page 3, line 2 to page 4, line 22 of the present application) The use of middle concentration layer helps reduce the spread of a depletion layer. (See page 11, line 17 to page 12, line 5 of the present application) In contrast, the device of Hsing is similar to the structure of a conventional device lacking a middle concentration layer disposed in a drain region as recited in claim 1 of the present invention. Thus, the Hsing device also may suffer from the negative effects of a depletion layer.

Moreover, the layer of Hsing is not "disposed at least from a predetermined position spaced away from said gate electrode to said high concentration drain region" as recite in claim 1. Disposing the middle concentration layer in this manner may help reduce the spread of a depletion layer to the high concentration region. In contrast, the Hsing reference lacks such a structure and so may suffer from the negative effects of a depletion layer spreading to the high concentration region.

Applicants further respectfully point out that to establish a prima facie case of obviousness, three basic criteria must be met including that there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. (See MPEP 2143.01 Suggestion or Motivation to Modify the References) The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). That is, the fact that the reference can be combined or modified is not sufficient to establish prima facie obviousness.

The office action states that the Hsing reference fails to disclose the "source region disposed in the substrate" as recited in claim 1 of the present application. It further states that Beasom discloses "a source region disposed in the substrate", and that it would have been obvious to one skilled in the art to combine the teachings of the two references to arrive at the claimed invention.

Applicants respectfully assert that the cited references, alone or in combination, fail to teach or suggest a "source region disposed in the substrate" as recited in claim 1 of the present invention for at least the following reasons. Specifically, one skilled in the art would not have been motivated to modify Hsing with the teaching of Beasom to arrive at a "source region disposed in the substrate" as recited in claim 1. In addition, attempting to combine the teachings of the Beasom reference with the teachings of the Hsing reference would destroy the function/operation of the Hsing reference.

FIG. 2 of the Hsing reference shows a transistor having a multiplayer structure: a substrate 20, a buried layer 23 formed on substrate 20, an epitaxial layer 22 formed on layer 23, a body layer 29, and a source region 32. Hsing explains that:

> If desired, an N+ buried layer 23 may be formed at the interface of the N- epitaxial layer 22 and substrate 20, using well known techniques to reduce the beta of any parasitic PNP bipolar transistor formed.

(column 3, lines 1-4) That is, this multilayer structure is important because it helps overcome some the problems of a conventional transistor structure such as shown in FIG. 1 and

described in the background section of the Hsing reference. For example, layer 23 may help reduce the beta of any parasitic transistor.

The Office action suggests that it would have been obvious to modify the structure of the Hsing reference to form a "source region disposed in the substrate." Applicant respectfully disagrees. In particular, to modify the Hsing structure would require the removal of the separate layers of the multiplayer structure of the Hsing reference. That is, one skilled in the art would have to remove epitaxial layer 22 and body layer 29 so that the "source region disposed in the substrate" as recited in claim 1 of the present invention. Removal of these layers would impair/destroy the function/purpose of the Hsing reference. For example, removal of the layer 23 would increase any parasitic of a transistor. (*See* column 3, lines 1-4) Alternatively, having the source region 32 penetrate layers 29, 22, and 23 to reach the substrate 20, would destroy/impair the operation/function of the Hsing reference. Thus, one skilled in the art would not have motivated to combine the teaching of the cited prior art references to arrive at the claimed invention.

Claim 2 should be allowable for at least the same reasons as above. In addition, Claim 2 should be allowable for the following additional reasons. The Office action asserts that FIG. 1 of the Kuroi reference discloses a "middle concentration layer is formed so that the impurity concentration **gradually** increases from said gate electrode to said high concentration drain region" as recited in claim 2. Applicant respectfully disagrees. FIG. 1 of the Kuroi reference shows a region 5 separate from region 6 which indicates that there is an abrupt change in concentration between regions 5 and not a concentration that "gradually increases" as recited in claim 2. Thus, claim 2 is not taught or suggest by the cited reference for these additional reasons

Accordingly, claims 1, as well as dependent claims 2-5, are not obvious in view of the prior art references.

Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

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